

AMENDMENT UNDER 37 C.F.R. § 1.111  
Application No.: 10/617,868  
Atty Docket No.: Q71312

### **AMENDMENTS TO THE CLAIMS**

**This listing of claims will replace all prior versions and listings of claims in the application:**

#### **LISTING OF CLAIMS:**

Claim 1. (previously presented): A magnetic recording medium comprising:  
a non-magnetic substrate;  
at least a soft magnetic layer formed on the non-magnetic substrate directly or indirectly;  
an orientation control film that is formed on the soft magnetic layer and controls the orientation of a film provided directly thereabove;  
an intermediate film formed on the orientation control film;  
a perpendicular magnetic recording film that is formed on the intermediate film and of which an axis of easy magnetization is generally oriented perpendicularly to the non-magnetic substrate; and  
a protective film formed on the perpendicular magnetic recording film,  
wherein the intermediate film is made of CoCrPtB and has a saturation magnetization (Ms) of at least 20 (emu/cc) and equal to or less than 200 (emu/cc).

Claim 2. (previously presented): The magnetic recording medium according to claim 1, wherein the saturation magnetization Ms of the intermediate film is at least 50 (emu/cc) and equal to or less than 150 (emu/cc).

Claim 3. (original): The magnetic recording medium according to claim 1, wherein the thickness of the intermediate film is at least 2 nm and equal to or less than 30 nm.

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Claim 4. (canceled).

Claim 5. (previously presented): The magnetic recording medium according to claim 1, wherein a total amount of a Cr content and a B content of the intermediate film is at least 23 at % and equal to or less than 35 at %.

Claim 6. (previously presented): The magnetic recording medium according to claim 1, wherein a Cr content of the intermediate film is at least 20 at % and equal to or less than 34 at %.

Claim 7. (previously presented): The magnetic recording medium according to claim 1, wherein a thickness of an amorphous structure, as an initial growth portion of the intermediate film, is equal to or less than 1 nm.

Claim 8. (previously presented): The magnetic recording medium according to claim 1, wherein the orientation control film has an amorphous structure.

Claim 9. (canceled).

Claim 10. (currently amended): A method ~~of~~for manufacturing a magnetic recording medium, comprising ~~the steps of~~:

a step of forming at least a soft magnetic layer on a non-magnetic substrate directly or indirectly;

a step of forming an orientation control film that controls the orientation of a film provided directly thereabove on the soft magnetic layer;

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a step of forming an intermediate film which is made of CoCrPtB on the orientation control film;

a step of forming a perpendicular magnetic recording film on the intermediate film, of which the axis of easy magnetization is generally oriented perpendicularly to the non-magnetic substrate; and

a step of forming a protective film on the perpendicular magnetic recording film, wherein conditions of forming the films are controlled so that a saturation magnetization  $M_s$  of the intermediate film is at least 20 (emu/cc) and equal to or less than 200 (emu/cc).

Claim 11. (previously presented): A magnetic read/write apparatus comprising:  
the magnetic recording medium of claim 1; and  
a single pole type head that records information on the magnetic recording medium and reads the information from the magnetic recording medium.

Claim 12. (previously presented): The magnetic recording medium according to claim 1, wherein the orientation control film comprises at least one alloy selected from the group consisting of Co alloy, Ni alloy, and Fe alloy.

Claim 13. (previously presented): The magnetic recording medium according to claim 1, wherein a permanent magnet film of which magnetization anisotropy is mainly oriented in an in-planar direction is provided between the non-magnetic substrate and the soft magnetic layer.

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Claim 14. (previously presented): The magnetic recording medium according to claim 13, wherein an undercoat film made of a Cr alloy or a B2 structural material is formed between the non-magnetic substrate and the permanent magnet film.

Claim 15. (currently amended): A magnetic recording medium comprising:  
a non-magnetic substrate;  
at least a soft magnetic layer formed on the non-magnetic substrate directly or indirectly;  
an orientation control film that is formed on the soft magnetic layer and controls the orientation of a film provided directly thereabove;  
an intermediate film formed on the orientation control film;  
a perpendicular magnetic recording film that is formed on the intermediate film and of which an axis of easy magnetization is generally oriented perpendicularly to the non-magnetic substrate; and  
a protective film formed on the perpendicular magnetic recording film,  
wherein the intermediate film is made of a Co alloy and has a saturation magnetization (Ms) of at least 20 (emu/cc) and equal to or less than 200 (emu/cc), and  
the orientation control film comprises at least one alloy selected from the group consisting of Co alloy, Ni alloy, and Fe alloy, and has an amorphous structure.

Claim 16. (previously presented): The magnetic recording medium according to claim 15, wherein the saturation magnetization Ms of the intermediate film is at least 50 (emu/cc) and equal to or less than 150 (emu/cc).

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Claim 17. (previously presented): The magnetic recording medium according to claim 15, wherein the thickness of the intermediate film is at least 2 nm and equal to or less than 30 nm.

Claim 18. (previously presented): The magnetic recording medium according to claim 15, wherein a total amount of a Cr content and a B content of the intermediate film is at least 23 at % and equal to or less than 35 at %.

Claim 19. (previously presented): The magnetic recording medium according to claim 15, wherein a Cr content of the intermediate film is at least 20 at % and equal to or less than 34 at %.

Claim 20. (currently amended): The magnetic recording medium according to claim 15, wherein the intermediate film has an initial growth portion and a thickness of an~~the~~ amorphous structure, ~~as an~~ initial growth portion of the intermediate film, is equal to or less than 1 nm.

Claim 21. (canceled).

Claim 22. (previously presented): The magnetic recording medium according to claim 15, wherein a permanent magnet film of which magnetization anisotropy is mainly oriented in an in-planar direction is provided between the non-magnetic substrate and the soft magnetic layer.

Claim 23. (previously presented): The magnetic recording medium according to claim 22, wherein an undercoat film made of a Cr alloy or a B2 structural material is formed between the non-magnetic substrate and the permanent magnet film.

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Claim 24. (previously presented): A method ~~of~~ for manufacturing a magnetic recording medium, comprising ~~the steps of~~:

a step of forming at least a soft magnetic layer on a non-magnetic substrate directly or indirectly;

a step of forming an orientation control film that comprises at least one alloy selected from the group consisting of Co alloy, Ni alloy, and Fe alloy and has an amorphous structure and that controls the orientation of a film provided directly thereabove on the soft magnetic layer;

a step of forming an intermediate film which is made of a Co alloy on the orientation control film;

a step of forming a perpendicular magnetic recording film on the intermediate film, of which the axis of easy magnetization is generally oriented perpendicularly to the non-magnetic substrate; and

a step of forming a protective film on the perpendicular magnetic recording film, wherein conditions of forming the films are controlled so that a saturation magnetization  $M_s$  of the intermediate film is at least 20 (emu/cc) and equal to or less than 200 (emu/cc).

Claim 25. (previously presented): A magnetic read/write apparatus comprising:  
the magnetic recording medium of claim 15; and  
a single pole type head that records information on the magnetic recording medium and reads the information from the magnetic recording medium.